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ABSTRACT

One component of a model of creativity, the application of an understanding of elements, was explored through a study of college students applying their understanding of such musical elements as harmony, melody, rhythm, timbre, and dynamics. The 24 subjects were students in a music appreciation class, and the project was implemented using a microcomputer workstation with MIDI capabilities. Students first developed familiarity with the sequencing software and then practiced musical concepts by producing a melody. The Band-in-a-Box software program was used to produce accompaniment for their melodies. All but one subject completed the activities, and most completed them within the expected 2-hour time frame. To determine the effectiveness of this approach in facilitating learning musical concepts, a follow-up test was given at the end of the project. The mean score of the experimental group was higher than that of the 33-student control group, but the difference was not statistically significant. It is suggested that the creativity-based approach also yielded results not measured by the follow-up test, such as improved student attitude. Attachments present four lessons in the application of the sequencer. One table illustrates the discussion. (Contains 4 references.) (SLD)

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Music Appreciation and Technology:

An Evaluation of A Creativity-based Approach Using a MIDI Environment

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March 21, 1993

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Music Appreciation and Technology:
An Evaluation of a Creativity-based Approach Using a MIDI Environment

The development of musical responsiveness is an important goal of music education for the general student as well as the one who majors in music. Traditionally music appreciation classes devote the most attention to listening and analysis activities for very practical reasons rather than using creative modes of instruction such as composing or performing. Reimer (1970, p. 19) states that "Composing is a mode of musical study which can be most effective for clarifying how music works and for giving the actual experience of bringing music to birth." He also suggests that all students "... can become more musically responsive through music making, which therefore constitutes an important element of general music education."

A challenge in establishing a creativity-based curriculum is the establishment of specific goals for creative activities. The use of improvisation or composing for an end in themselves is criticized by some as being inefficient at best. Kratus (1990, p. 34) suggests that the first step in curriculum development is to analyze the components that make up the creative process and then formulate broad goals based on those components.

Both Kratus (1990) and Balkin (1990, p. 30) suggest that a model for the components of creativity is (1) the person creating, (2) the process of creation (e.g. improvising or composing), and (3) the product created (e.g. an improvisation, composition, or performance). Kratus proposes corresponding goals from these components to be, for example, (1) "Students will approach musical activities in a creative manner," (2) "Students will express themselves musically through improvisation,

composition, or creative performance," and (3) "Students will apply an understanding of musical elements ... to the production of created music."

This research project sought to explore only the third component of the creativity model set forth above which was for students to apply their understanding of musical elements such as melody, harmony, rhythm, timbre, and dynamics to a creativity-based project. The subjects who participated in this project were college students who were taking music appreciation for a general education elective.

This project was implemented using a microcomputer workstation with MIDI capabilities. To illustrate the potential for this technology Reimer (1989, p. 28) states "Just as the phonograph allowed all people direct access to all music through listening... the developing computer technologies are providing all people with the capacity to do something that only the tiniest fraction of people in Western cultures could do previously -- to compose." He explains that this is possible because few technical obstacles such as a knowledge of music notation remain.

The type of software employed for this project was Music Printer Plus, a notation package, Sequencer Plus Gold, and Band-in-a-Box which facilitates the recording of chords in a song-writing format. The workstation components are as follows: IBM-compatible computer with an MPU-401 compatible MIDI interface card, a Peavey DPM2 polyphonic synthesizer, a stereo amplifier and speakers, and a laser printer.

Subjects were obtained on a volunteer basis. Participation in the project, however, was given consideration in the course evaluation in order to provide incentive for students to be a part of the study.

The twenty-four subjects used for this pilot study were of a widely

diverse background. Scores on their ACT exams ranged from 17 to 30, and their classifications were from freshman through senior. A wide difference in backgrounds was found to be in the area of both musical experience and computer expertise. Previous musical experience ranged from 0 to 19 years and computer expertise ranged from those who had no formal training with computers to those who owned their own computer and were sophisticated users of a variety of software applications. The authors believed that the diverse backgrounds of the subjects in our pilot study would perhaps help us identify patterns in problems that might arise in carrying out the creative applications.

The activities designed for the subjects were constructed to meet several criteria. First, the time allotted for each one to complete the activities was two hours. A very practical consideration in this study had to be the number of hours the lab could be scheduled and the times that a consultant could be available to assist in the completion of the activities. Second, the activities were designed to have the subjects apply their understanding of musical concepts and elements in creative applications. (A copy of the directions given to the subjects is attached to this paper.)

The purpose of the first activity was to develop familiarity with the sequencing software used in the project. They were required to load and play a song then change its tempo. In addition they learned the concepts of track, channel, and program associated with the use of a sequencer. Finally, they recorded a track of their own by improvising on the synthesizer to a "blues" progression.

The second activity gave the subject practice with the concepts of phrase, tonic, and dominant first by listening to a song. Then they

composed a phrase of their own and finally composed a two phrase melody of their own which applied these concepts.

The next activity used a music notation software package to enable the subjects to produce their melody composed in the previous session in music notation. The notated version of their melody then allowed the subjects to assign approriate harmony to their melodies. The subjects were encouraged to use the tonic, subdominant, and dominant seventh chords in this activity, and they were informed of some simple rules for assigning chords to their melodies.

The final activity required the use of software known as Band-in-a-Box to produce the accompaniment for their melodies. This software only required that students enter chord symbols at appropriate places within measures that are numbered. The program then produced an accompaniment in one of 24 styles they could choose. Once the accompaniment was saved as a MIDI file it could then be imported into the sequencer and combined with their melody. Their final product was then a melody which they composed and accompaniment for which they chose the chords and style.

Our experience with this project as well as those who participated has been very positive. All but one of the subjects who began the activities completed them in an appropriate manner and most completed them within the projected two-hour time frame. The evaluation of the projects proceeded in the following manner. Subjects stored their projects on separate floppy disks so that their files could be easily identified and imported into the sequencer and played. The authors recorded the results on audio cassette and evaluated the results along with the aide of the research assistant who worked with the individual

subjects on the activities.

In order to determine the effectiveness of this approach in facilitating the learning of musical concepts, a follow-up test was administered at the conclusion of the project. The test included items which addressed the comprehension of musical concepts that were used both in the creative activities and in regular classroom discussion. The test was administered both to students who participated in the project and those who did not in order to determine whether the creative activities made a significant diffference in the learning of specific musical concepts.

It must be mentioned that these statistics are included in this paper for information only since our experimental group included volunteers rather than a random or balanced sample. We gathered this information to determine whether or not these activities had at least the potential to help the students learn concepts. As the data shown in table one reflect, the test was given to 77 students of which 24 completed the creative activities. While the mean score of the experimental group (group 2) is higher than that of the control group a t-test did not show the difference to be significant ($p<.05$).

Table One MIDI PROJECT COMPARISON SCORES

TTEST PROCEDURE

Variable: SCORE

GROUP	N	Mean	Std Dev	Std Error	Minimum	Maximum
1	53	68.00000000	14.59320179	2.00453043	33.00000000	93.0000000
2	24	73.54166667	17.53996472	3.58033031	33.00000000	100.0000000

Variances	T	DF	Prob>|T|
Unequal	-1.3505	38.0	0.1848
Equal	-1.4479	75.0	0.1518

For H0: Variances are equal, F' = 1.44 DF = (23,52) Prob>F' = 0.2716

The difficulty in implementing this type of activity on a larger scale is two-fold. One problem is scheduling enough time with the equipment needed. A second problem associated with this project is that students cannot work alone. Students need both technical assistance with the hardware and software used and assistance with the understanding and application of musical concepts. An ideal environment for this type of activity would be a multi-station lab where one person could help with the needs of several students working at the same time.

We do believe that refinement in our process can yield more significant results in the learning of musical concepts. We also believe that creativity-based activities yield results that were not measured by our follow-up test. For example, the attitude of the students that completed the project was very positive. This fact in combination with the results of our follow-up test strongly commends this approach for future investigation.

References

Balkin, A. (1990). What is creativity? What is it not? Music Educators Journal. 76(9). 29-32.

Kratus, J. (1990). Structuring the music curriculum for creative learning. Music Educators Journal. 76(9). 33-37.

Reimer, B. (1989). Music education as aesthetic education: Toward the future. Music Educators Journal. 75(7). 28-30.

Reimer, B. (1970). A philosophy of music education. Englewood Cliffs, NJ: Prentice Hall.

Software

Music Printer Plus
Temporal Acuity Products, Inc.
Building 1, Suite 200
300 - 120th Avenue N.E.
Bellevue, Washington 98005
(800)426-2673

BAND-IN-A-BOX
P.G. Music Inc.
111-266 Elmwood Avenue
Buffalo, NY 14222
(416)528-7043

Sequencer Plus Gold
Voyetra
333 Fifth Avenue
Pelham, NY 10803
(800)233-9377

ORIENTATION TO SEQUENCER PLUS GOLD

1. Turn on power to amp., keyboard, computer, and monitor.
   (Set sequencer program to 021 using program buttons on instrument)

2. Select the sequencer application from menu on screen ('A' <CR>).

3. Play a song using the sequencer:

   a. Type 'f' to access files
   b. Highlight "Maplerag" with arrow keys or mouse.
   c. Type 'L' <CR> to load the file
   d. Press the space bar to begin the song.
   e. Press the space bar again to stop the song.

4. Experiment with changing the tempo of the song:

   a. Type 'T' to access tempo menu
   b. Type a new number for the tempo and press return (16-255). Play using the same procedure as before.
   c. Repeat as desired, then restore the original tempo (190).

5. Data can be sent to the keyboard over 16 different channels. Experiment with this setting:

   a. Change the channel of track 2 to "2" by moving the cursor to the row of track 2 and the channel column (CH) and typing '2' <CR>.

6. 127 different timbres can be accessed using the "Program" setting.

   a. Locate the DPM2 program list under the keyboard. At the top of the list are instructions for assigning the proper number of a program. (You can preview sounds on the keyboard by entering three-digit numbers on the "program" keypad on the synthesizer.)

   b. Insert numbers into the program column (PRG) by moving the cursor to the desired location and typing the proper number followed by return.

   c. Play the song with these settings, then try others

7. Learn how to record your own track

   a. Delete the song currently in memory by typing "D" then "A".

   b. Access the files menu by typing "F".

   c. Move the cursor to blues, then type 'L' <CR> to load.

   d. Listen to this song (use the space bar to toggle on and off).

   e. Move the cursor to track 4

f. Practice improvising on the keyboard while the piece is playing (use a, c, and e as target notes).

g. Press "R" to access record function.

h. Press the space bar to begin recording and press it again to stop. If you are not happy with your session, just delete it and repeat the recording process.

i. Name your track by typing "N" the follow instructions

8. Save this session so that you can come back at a later time listen or make some modifications.

   a. Access the Files menu ("F")

   b. Insert your diskette into drive a:

   c. Move cursor to highlight "A:" then type <CR>.

   d. Type "S" to save; enter your name as file name. (When completed your new file should appear in the list on the screen)

9. Finished with session number one.

   a. Press <ESC>
   b. Press 'Q' twice
   c. Power down equipment

Introduction to Melody

1. Melodies are composed of smaller units called phrases. The phrase ends on a resting place or cadence which punctuates music in much the same way that a comma or period punctuates a sentence.

2. Amazing Grace is an example used in the text to denote phrase structure (p.9).

   a. Follow the instructions from session one for starting up the system. Access the "files" menu and load "Amazing".

   b. Play the song noting the cadences which mark the phrases as described in your text.

3. The cadence marking a phrase may be either final sounding or inconclusive. This quality is largely affected by the pitch of the melody at a cadence. The tonic (I) usually gives a greater sense of completion than the dominant (V).

   a. Access files and load "Phrase1".
   b. Play "Phrase1"
   c. Improvise a second phrase of four measures (16 beats) that ends on the tonic (C).
   d. When you are ready, record the results on track two (be sure the cursor is on track two when you press "R" to record; space bar to start and stop).
   e. Play the final product. If you are satisfied with your results, save your session as "Phrase2" ('F' for files; Highlight 'A:'; 'S' to save and follow instructions). If you wish to try again, delete track two and record another phrase and save the results. <ESC>

4. Now it is time to compose a two-phrase melody of your own.

   a. Remove the previous song by typing "D" followed by "A".

   b. Use the key of "C" for your melody if you are most comfortable with it. Be sure the cursor is in track one.

   c. Compose two four-bar phrases: Begin with the tonic (C), end phrase 1 on the dominant at the end of bar four, and end phrase 2 on the tonic (C) at the end of bar eight.

   d. Improvise on the keyboard until you are ready to record then press 'R'. Press space bar to begin (wait two bars before beginning.) Remember, that you may delete and record until you are satisfied.

   e. HINT: If you have a problem recording both phrases at one time, record your phrase 1 in track 1 then move the cursor to track two and record your second phrase (wait until you hear phrase 1 completed before recording the second phrase).

   f. Save as MYMELODY when you are ready. ('F' for files; highlight

'A:'; type 'S' and follow instructions.)

5. End session two. (<ESC>; 'Q' twice; power down)

Harmonizing a Melody, I

1. In this lesson you will print a notated version of your melody and then decide what chords should be used to harmonize it.

2. First load the sequencer by selecting "A" <cr> from the main screen.

3. Load your song into memory:

   a. Access files (F)
   b. change to a:
   c. Load (L, <cr>) your song
   d. <esc> to get to main screen

4. Play the melody (space bar)

5. Save as a MIDI file:

   a. Access files menu (F)
   b. Toggle "M" (Mode) to change to .MID extension
   c. Change to a: and Save (S) to your diskette. (accept default settings)
   d. <esc> then Q (quit) twice to leave the sequencer.

6. At the main menu select "C" <cr> to load the printing program.

   a. enter mymelody <cr> at the 1st prompt.
   b. Press "F10" to accept default settings for this screen and next one.

7. Import your melody into MPP

   a. Shift <f9> to get MIDI import menu
   b. Enter correct path and filename for your tune.
   c. Press <F10> to begin importing and enter when completed (change the default settings to begin at bar 3 if you like).
   d. If you wish position the cursor (mouse or arrow keys) at the beginning of the top staff and press "C" until a treble clef sign appears.
   e. Press <cr> when it is in position and repeat for other staves.

8. Print your melody

   a. Turn on printer (switch is on the right side)
   b. Access print menu with <alt><F8>; accept defaults with <F10>
   c. After the song is printed leave MPP by typing <F10> then Q (do not save the file)

9. Using rules on harmonizing a melody learned in class, select a chord from the tonic, subdominant, and dominant seventh (C, F, or G7 in the key of C) to harmonize your melody. Here are some reminders:

   a. The tonic chord has C, E, and G (1,3,5); the subdominant chord uses F, A, and C (4,6,8), and the dominant seventh chord has G, B,

D, and F (5,7,2,4) as chord tones.

b. Begin and end with the tonic (C) to establish the key.

c. The next most important chord in establishing key is the dominant seventh (G7). End Phrase 1 with it and use it for the next to last chord of phrase 2.

d. Select a chord containing the melody note as a chord tone for the remaining song. (The assistant will help you as needed)

Harmonizing a melody, II

1. Load Band-in-a-Box by typing "B"<CR> at the main menu.

2. Enter the chord names by the measure numbers.

3. Press <tab> to set tempo, style, bar 8 for chorus end, one for number of choruses. <esc> to leave this screen

4. Press <F4> to play.

5. Save as a MIDI file.

   a. Type <ALT><F> to get into files window; change to a:
   b. At main screen, type <F6>;<CR> to regenerate tracks
   c. Name your file.
   d. Exit Band-in-a-Box, <F10>; <Y>

6. Load Sequencer from main menu.

7. Load Midi file from your diskette directory.

   a. Access files <F>.
   b. Press <M> (mode) to get to screen with ext.mid heading.
   c. Change to A:
   d. Load <L> <cr> your melody file, and then load your chord file.

8. Play the results (spacebar). If you need to remove lead-in measures you can do that easily in view mode (<V>). Position cursor on bar 3 and backspace twice.

9. Feel free to alter your file regarding program numbers or dynamic levels etc. Save the combined melody and accompaniment on your diskette and MYSONG.mid.